EXTENSION NOTE

forest sciences
NELSON FOREST REGION

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Using Alternatives to Clearcutting in Viewscapes: Case Study in the Columbia Forest District in Southeastern British Columbia

- **Alternative silvicultural systems are operationally feasible for harvesting in visually sensitive areas.**
- **The Silviculture Prescription must be clear about approaches to future entries.**
- **Supervision of the layout and harvesting activities is critical to ensuring that objectives are met.**

INTRODUCTION

Due to past concentration of timber harvesting in non-visually sensitive areas within the Columbia Forest District, timber inventory in these areas is declining. Therefore a higher proportion of harvesting is occurring in visually sensitive areas, especially along the Trans-Canada Highway. Greater emphasis is now placed on managing these portions of the landscape in accordance with approved higher level plans. Through the declaration of Scenic Areas and establishment of landscape alteration objectives, these plans address the public's expectation that views will be protected. The need to employ visually sensitive harvesting patterns in these declared Scenic Areas is now more acute than ever before.

In 1999, Downie Street Sawmills Ltd. initiated a trial to test several different harvesting patterns in a visually sensitive area along the Trans-Canada Highway in southeastern British Columbia (BC). The strategy was to increase the visual absorption capability[1] of the landscape unit by breaking up the uniform canopy with small openings and textural changes. This will allow for more harvesting opportunities over time, because harvesting is less noticeable in a more textured landscape, and future entries will be permitted once adjacent areas have reached visually effective green-up.[2]

The trial will also help to identify suitable silvicultural systems and harvesting techniques, and train local forest workers in these techniques. In the long term, if these areas can be harvested successfully, the available supply of wood will increase, as will employment. This Extension Note describes the engineering, layout, prescription development, silvicultural systems, harvesting, and costs associated with the trial.

SITE DESCRIPTION

Portions of the study block are visible while travelling westward along the Trans-Canada Highway, approximately 13 to 18 km east of the city of Revelstoke, on the south side of the Illecillewaet River (Figure1).

The block is in the Wells Gray variant of the Interior Cedar-Hemlock wet cool biogeoclimatic subzone (ICHwk1). Elevation ranges from 600 to 930 m; the terrain is variable, with slopes ranging from 0 to 90% on a predominately northern aspect. The gross area is 46 ha.

Due to past fires, the forest is a younger mature type, unlike the rest of the District which is mostly old-growth forest. The timber type is mature hemlock, cedar, Douglas-fir, and white pine, aged 100 to 120 years, with a basal area of about 50 m^2/ha. The merchantable volume is approximately 517 m^3/ha, the average height is 31 m, and the average diameter is 31 cm. The study area contains approximately 664 total stems/ha and 44 snags/ha, based on preharvest cruise data.

PLANNING AND PRESCRIPTION DEVELOPMENT

A field reconnaissance was conducted as a part of the development of the engineering plan that formed the basis for the *Integrated Visual Design Plan* prepared by Downie Street Sawmills (Fairhurst 1997). Road locations, harvesting methods, and appropriate silvicultural systems

[1] Visual absorption capability: A component of the visual landscape inventory that rates the relative capacity of a landscape to absorb visual alterations and still maintain its visual integrity (BCMOF 2000).
[2] Visually effective green-up: The stage at which regeneration on a cutblock is perceived by the public as being newly established forest. The forest cover on the cutblock must generally be of sufficient height to block stumps, harvesting debris, and bare ground from view (BCMOF and BCMOE 1999).

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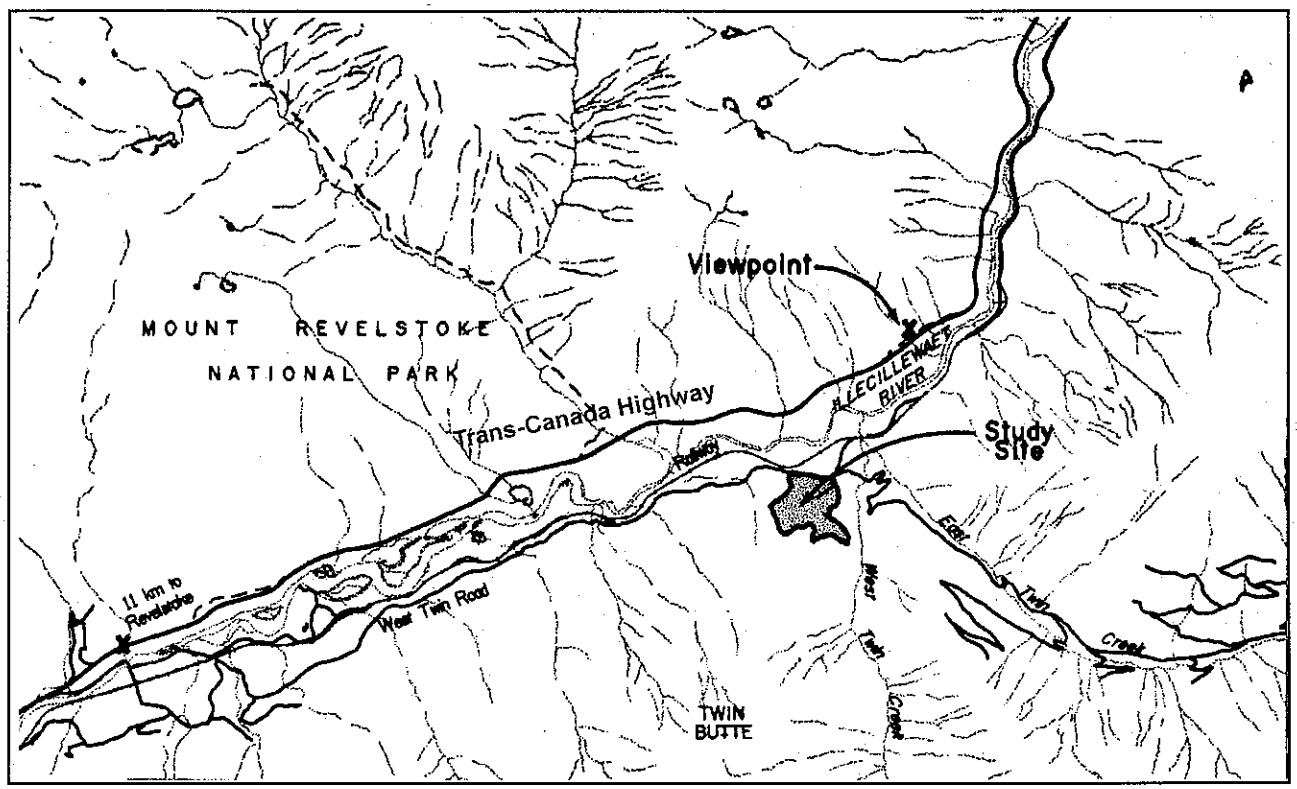

Figure 1. Location of the study site in southeastern BC.

were determined on a site-specific basis.

The objectives stated in the Silviculture Prescription for the harvesting trial area are:

- Maintain the visual quality of the area as viewed from the Trans-Canada Highway, while introducing textural variability into the landscape to increase its visual absorption capability.
- Manage the mixed stand of hemlock, cedar, Douglas-fir, white pine, and aspen to produce a variety of commercially valuable wood products.
- Manage on an even-aged basis, using a variety of silvicultural systems and harvesting methods.
- Enhance biodiversity values.
- Experiment with silvicultural systems to assess feasibility, productivity, and potential applications for other sites.
- Provide an opportunity to learn about visually sensitive cutting patterns, so that this knowledge can be applied to other sensitive sites.

Once the silvicultural systems and harvesting methods were determined, Downie hired local harvesting contractors to assist with laying out their respective harvesting units and access routes. The Silviculture Prescription has eight different standard units based on different silvicultural systems and harvesting methods (Table 1).

This Extension Note summarizes the site-specific conditions, prescribed silvicultural systems, harvesting methods, and management lessons for six units: preparatory cut for shelterwood (SU B), commercial harvest (SU D), group shelterwood (SU E), commercial harvest/cable (SU F), clearcut (SU G), and commercial harvest/helicopter (SU H) (Figure 2). The remaining two units, shelterwood (SU A) and old-growth recruitment (SU C), will be discussed in a separate report after harvesting is completed.

PREPARATORY CUT (SU B)

Site-Specific Conditions

Slopes on this 8.9-ha site range from 0 to 60% and average 25%. The lower portion is quite gentle, while the upper slopes are broken with benches and steeper slopes. The timber type prior to harvesting was western hemlock (51), western redcedar (46), and trembling aspen (3) (based on basal area). Total basal area was 46.9 m^2/ha, with 560 stems/ha. The fine-textured soils and high soil moisture (mesic to subhygric) required that harvesting operations be conducted with low-ground-pressure-equipment during dry conditions, or on a snowpack.

Prescribed Treatment

The silvicultural system planned for SU B is "shelterwood", using conventional ground-based harvesting methods. The first entry was a preparatory cut. The Silviculture Prescription states that 40 to 50% (21 m^2/ha) basal area was to be retained. Cedar was the preferred leave tree, for the purposes of accumulating more volume and value.

Conventional Winter Harvesting

This unit was harvested during late March 1999 on a 0.7-m-deep snowpack. The pre-marked trees were hand felled. A hoe with a clam bucket bunched the trees and a

Table 1. Standard units in the Silviculture Prescription, based on treatment and harvesting method.

Standard Units	Treatment	Harvesting description
SU A	Shelterwood	Conventional, ground-based, summer/fall harvesting.
SU B [a]	Preparatory cut for shelterwood	Conventional, ground-based, winter harvesting.
SU C	Old-growth recruitment	Horse harvesting and small skidder.
SU D [a]	Commercial thin (clearcut silviculture system)	Uphill cable harvesting with intermediate supports.
SU E [a]	Group shelterwood	Downhill cable harvesting.
SU F [a]	Commercial thin	Downhill cable harvesting (thin area between SU E).
SU G [a]	Patch cut	Helicopter harvesting.
SU H [a]	Commercial thin	Helicopter harvesting.

[a] This report discusses only SU B, D, E, F, G, and H.

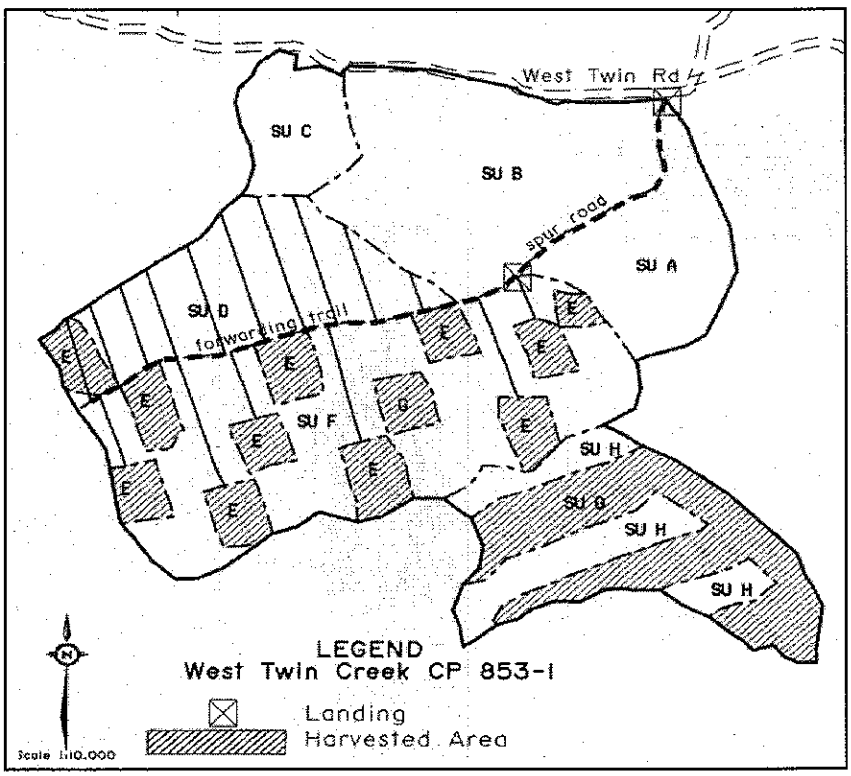

Figure 2. Block layout of the study site.

swing grapple mounted on a crawler-tractor skidded the wood on pre-designated trails. A post-harvesting survey indicated that approximately 43% of the basal area was retained; of that, approximately 11.8 m^2/ha (152 stems/ha) are cedar, ranging from 15 to 68.2 cm dbh (average 28.9 cm). Approximately 16% of the residual trees had minor scarring on them (average 24% of circumference) (Figure 3), which was less than the allowable amount stated in the Silviculture Prescription. Very little soil disturbance occurred.

Management Lessons

- The amount of basal area removed was within the range stated in the Silviculture Prescription.
- The harvesting contractor helped to lay out the pre-designated trails, and an experienced forester marked the trees

"to leave" while supervising harvesting operations. This helped to ensure the harvesting operation was successful.

- The harvesting equipment and methods worked well; a suitable feller-buncher working in tandem with a grapple skidder would function equally as well.
- Very little soil disturbance occurred because the trails were pre-designated, and the unit was harvested on a snowpack.
- Great care should be taken to avoid damaging leave trees, especially to the remaining cedar crop trees. Removal of damaged trees should be encouraged during the initial harvesting operations unless doing so would open up the stand to windthrow. If a second regeneration cut is necessary, then previously damaged trees should be targeted for removal.
- Overall, the treatment was successful. The desired results were achieved, economically and within the parameters of the Silviculture Prescription.

COMMERCIAL THIN (SU D)

Site-Specific Conditions

The terrain in this 6.5-ha unit is steep, with some rocky outcrops. The slopes range from 30 to 60% and average 50%. The terrain is benchy, therefore intermediate supports were required to achieve adequate lift for cable harvesting. The timber type prior to harvesting was Douglas-fir (33), western hemlock (51), western redcedar (25), trembling aspen (5), and western white pine (2) (based on basal area). The Douglas-fir (36 m) and white pine (41 m) were taller than the dense, shorter cedar and hemlock (30 m). Prior to harvesting, the basal area was 51.8 m^2/ha, with 681 stems/ha.

Prescribed Treatment

This treatment was a commercial thin. The Silviculture Prescription states that 40 to 50% of the basal area (23.2 m^2/ha) was to be retained. The cedar and hemlock were left to accumulate more volume and value, and to provide visual screening. The cedar is slightly smaller than optimum commercial pole size, so it was left to accumulate another 10 to 20 years of growth and develop into high-quality poles. Douglas-fir was targeted for removal. Some Douglas-fir and white pine were reserved, primarily as wildlife trees.

Uphill Cable Harvesting

In July 1999 this unit was commercially thinned using a C40 Skylead yarder, with a motorized slack-pulling carriage (Maki II) (Figure 4). Lateral yarding limit was 30 m, which worked most effectively with intermediate spars. A rubber-tired grapple skidder (JD648D) moved the wood from the yarder site along the forwarding trail to the landing. Prior to harvesting, the intermediate supports and yarding corridors were pre-designated with the assistance of the harvesting supervisor. The production was approximately 6 truckloads/day. Nine corridors were pre-designated to a width of 5 m; however, the post-harvesting width ranged from 5.4 to 9 m (average 7.4 m). The trees

Figure 3. Damage to residuals in the SU B unit.

Figure 4. Commercial thinning (SU D), uphill cable.

were not pre-marked on this site; however, a forester worked with the fallers to identify the leave/take trees. Approximately 53% of the basal area (or 64% of the stems) was retained. Despite the corridors ending up wider than prescribed, approximately 30% of the residual stand had scars ranging from 5 to 40% of the circumference. This was still less than the allowable limit stated in the Silviculture Prescription.

Management Lessons

• The prescription should state the actual size (minimum, target, and range) of cedar poles desired, so that timing of the next cut (clearcut) is planned and easy to monitor.

• This treatment was successful; however, great care should be taken to minimize damage, especially if the goal is to produce quality cedar poles.

• Designate yarding corridors before marking leave trees, to reduce damage.

GROUP SHELTERWOOD (SU E)

Prescribed Treatment

Site conditions on this unit are very similar to SU D. The difference is that this unit was downhill cable harvested. The silviculture treatment is to plant enough Douglas-fir to meet the minimum stocking standards, and to rely on natural regeneration for infill of cedar and hemlock.

Downhill Cable Harvesting

This unit was harvested in the summer of 1999 using the same equipment as in SU D. Eleven patches were harvested using seven access corridors. The timber was yarded down to the forwarding trail. Three of the patches are adjacent to the road. The width of the corridors exceeded the prescribed 5 m because damaged trees were removed along the original edges of the corridor. Actual width of the corridors ranged from 5 to 11 m (average 8.5 m).

Management Lessons

• The Workers Compensation Board was concerned about safety at this operation because the timber was yarded down steep slopes and the yarder was directly in line with the yarding path. These concerns were addressed by off-setting the position of the yarder relative to the yarding path, or putting the yarder on an elevated pad to arrest the logs.

• Use chokers as short as operationally feasible to reduce damage to residual trees.

• Groups or small openings are likely more operationally feasible than uniform partial cutting treatments when using downhill cable harvesting.

COMMERCIAL THIN (SU F): Downhill Cable Harvesting

This unit is the forested area between the SU E groups. It was planned for up to 60% basal area removal, targeting the Douglas-fir in easily accessible areas. The bulk of the trees removed were adjacent to the harvested patches. Portions furthest from the patches were not harvested.

Harvesting in this area was relatively unsuccessful; it was not possible to harvest adjacent to the patches due to steep slopes, risk of damage to residuals, and safety concerns. Yarding uphill, or helicopter harvesting, may be more feasible options under these conditions.

PATCH CUT (SU G): Helicopter Harvesting

Of all the units, this one is the most visible from the Trans-Canada Highway. The block design helped to introduce texture and variability into the landscape. The block shapes resemble the visible rock talus slopes to the south-east of the clearcuts. Harvesting operations occurred during the winter of 1999. Two landings were used to maximize efficiency and safety. The sites have many non-merchantable stems on the ground, but the sites should be plantable in the spring/summer of 2000, after the fine fuels settle. This unit will be planted with Douglas-fir, western redcedar, and western hemlock.

COMMERCIAL THIN (SU H): Helicopter Harvesting

This unit is the forested area between the small clearcuts (SU G). It was planned for harvesting with up to 60% basal area removal, targeting the Douglas fir. The bulk of the trees removed were adjacent to the clearcuts. The portions furthest from the edges of the clearcut patches were not harvested to prevent windthrow due to helicopter rotorwash.

TRAINING AND EXTENSION / COMMUNICATION

During harvesting operations, Downie Street Sawmills Ltd. organized several well-attended tours for forest workers, high school students, teachers, and the general public. In the spring of 1999, a three-day, cable-harvesting training session for forest workers was conducted on site. Harvesting contractors gained valuable experience from on-site training. Many forest industry and BCMOF staff have visited the site. A Forest Renewal BC sign has been placed at the head of the trial area.

COSTS

The costs to complete the integrated visual design were approximately $13/ha. The layout for the entire trial area was more than double the cost of layout for clearcut systems. The cost of cable harvesting (SU D and SU E) was approximately double the cost of clearcut harvesting. The helicopter harvesting costs were $60/m^3 (tree to truck). The cost of conventional ground-based harvesting (SU B) was 20% more than the cost for clearcutting. Additional supervision and marking costs were also incurred. Part of these costs were offset by FRBC funding. Costs should decline as experience is gained.

RECOMMENDATIONS

Based on the experience gained in this trial, the following recommendations are made:

• The Silviculture Prescription should clearly define the selected silvicultural system, and whether or not there are any regeneration objectives. However, the Silviculture Prescription should be flexible enough to allow for minor changes if required (e.g., residual basal area or stem density targets).

• Supervision, especially at the beginning of the project, is critical to ensure that the objectives and expectations are understood and observed.

• Visually sensitive areas in the Columbia Forest District are generally on steeper terrain, which often requires cable or helicopter harvesting. Uphill yarding provides the best opportunities for addressing visual concerns with a

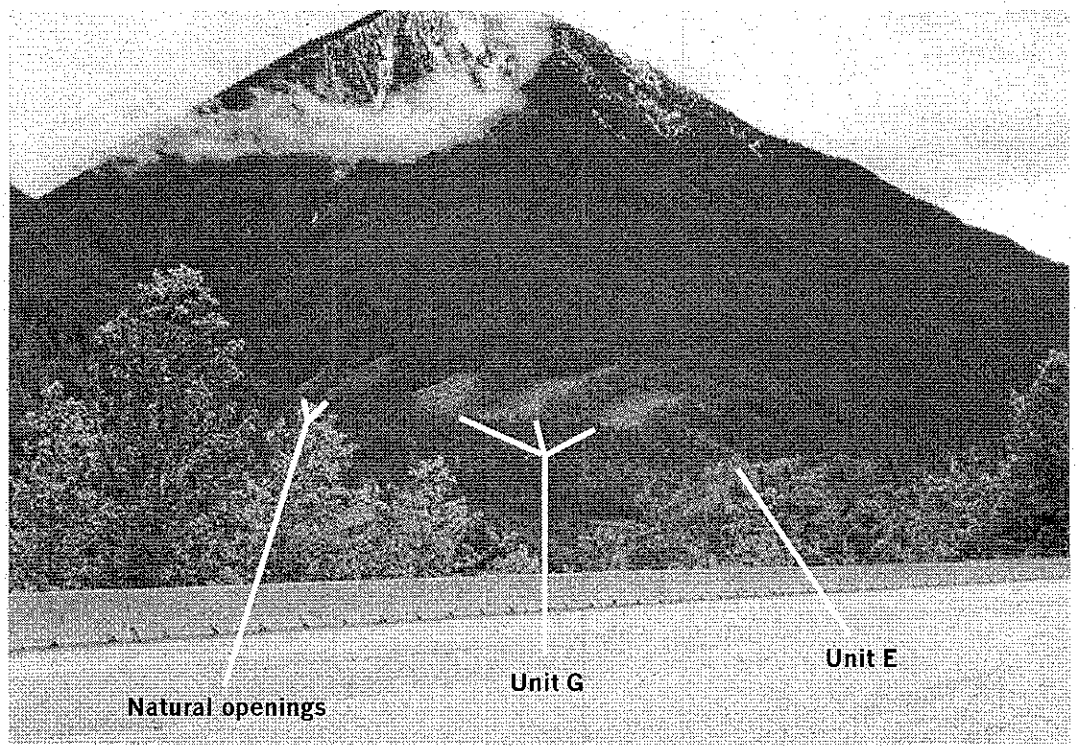

Figure 5. View of trial area from Trans-Canada Highway. The helicopter unit (SU G) and the group shelterwood unit (SU E) are visible.

uniform distribution of leave trees, whereas downhill yarding can be used where small openings or groups are acceptable.

• Tree marking: For ground-based systems, marking trees during harvesting is more cost effective than marking prior to harvesting. The person doing the marking must understand the silvicultural objectives and harvesting constraints. Also, this approach allows some flexibility, and makes it easier to address safety concerns.

• Tree marking: For cable-based harvesting operations, yarding corridors should be located before leave trees are marked, to reduce damage to residual trees.

SUMMARY

With more harvesting activity expected to take place in visually sensitive areas in the near future, the use of alternatives to clearcutting will be required more often. Although alternatives to clearcutting are potentially more costly to implement, it may not be otherwise possible to access timber in sensitive areas.

Overall, Downie Street Sawmills Ltd. believes this project was successful because the objectives of the prescription were met, it raised the profile of using alternative silvicultural systems in viewscapes, and it provided an opportunity to train local forest workers in new practices. The results of the project will help planners employ alternative silvicultural systems in similar terrain where protecting viewscapes is a concern (Figure 5).

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